



## California Energy Commission

### RESIDENTIAL STANDARDS

#### Questions and Answers

**Q** *If I'm going to replace the heating system(s) in an existing residential building (single-family or low-rise apartment building for example), what requirements of the Energy Efficiency Standards apply?*

This scope of work will either be considered an alteration or a repair by the building department. If it is an alteration, the following mandatory requirements apply:

- Certification of the equipment (not applicable to electric resistance heating equipment) (Section 111).
- Duct construction and insulation if new ducts are being installed (Section 150(m)).
- Setback thermostat requirements apply if the thermostat is replaced unless the equipment is a gravity gas wall, floor or room heater, or a non-central electric heater (Section 150(i)).
- The building department can request sizing calculations (Section 150(h)).

If the project is a repair, no *Energy Efficiency Standards* requirements apply.

**Q** *I think the Standards are now clear that documentation authors are not regulated by the Business and Professions Code. I am unclear, however, as to the meaning of the sentence in Section 10-103(a)(1) which states "Subject to the preceding paragraph,*

*persons who prepare energy compliance documentation shall sign a statement that the documentation is accurate and complete" (Title 24, Part 1). What does the phrase "subject to the preceding paragraph" mean?*

This phrase is to emphasize that the documentation author is performing a service under the authority and responsibility of the person with overall project responsibility. The documentation author is only responsible for the accuracy of the energy compliance documentation. The ultimate responsibility for compliance with the *Energy Efficiency Standards* remains with the person who is authorized by the *Business and Professions Code* to take responsibility for the project.

**Q** *When is an historical building exempt from the Energy Efficiency Standards (Title 24, Part 6)? Are additions to historical buildings also exempt?*

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## Questions and Answers (continued)

A building is exempt from Part 6 when it is a “qualified historical building.” This term is defined in Section 8-302 of Title 24, Part 8 as a “structure or collection of structures, and their associated sites, deemed of importance to the history, architecture, or culture of an area by an appropriate local, state or federal governmental jurisdiction. This shall include designated structures on official existing or future national, state or local historical registers or official inventories, such as the National Register of Historic Places, State Historical Landmarks, State Points of Historical Interest, and officially adopted city or county registers or inventories of historical or architecturally significant sites, places or landmarks.”

“Additions which are structurally separated” from the historical building are not exempt from the *Energy Efficiency Standards* and must comply with current building codes (*Historical Building Code*, Title 24, Part 8, Section 8-504).

### **Q What version of Micropas is acceptable for compliance calculations?**

Version 4.5 is the only acceptable version for compliance submittals after January 1, 1996. (See clarification of decertification notice dated December 15, 1995 for more information, particularly regarding master plans. Both the original notice, dated November 21, 1995, and the clarification notice are available on the FactsLine (see back page) by requesting document 3080001.)

### **Q As a manufacturer of fenestration products, I place a temporary label with the air infiltration rates on my products (Section 116(a)). Can you clarify which products must be tested and certified?**

Each product line must be tested and certified for air infiltration rates. Features such as weather seal, frame design, operator type, and direction of operation all effect air leakage.

Every product must have a temporary label certifying that the air infiltration requirements are met. This temporary label may be combined with the temporary U-value label.

### **Q I thought I was supposed to insulate the water heater pipes for either the first five feet or the length of piping before coming to a wall, whichever is greater. Did I misunderstand?**

Yes. The requirement is that you must insulate the entire length of the first 5 feet, regardless of whether there is a wall (*Energy Efficiency Standards*, Section 150(j)2). You have two options: (1) interrupt insulation for a fire wall and continue it on the other side of the wall, or (2) run the pipe through an insulated wall, making sure that the wall insulation completely surrounds the pipe. [Chapter 2 of the errata (arriving soon) will contain an updated diagram and explanation.]

### **Q When insulating the water heater piping, do I need to put insulation on the first 5 feet of cold water pipe?**

Yes. Section 150(j)2 requires insulation on the cold water pipe also. When heated, the water expands and pushes hot water out the cold water line. This can start thermosyphoning, which continues to remove heat from the stored water. The insulation helps reduce this effect.

### **Q If the energy calculations show R-4 pipe insulation, is this a credit? What are the installation requirements for obtaining credit?**

If R-4 pipe insulation is indicated on any form other than the MF-1R it is being used to obtain credit. (The MF-1R form indicates only mandatory insulation requirements — the first 5 feet of piping for a non-recirculating system or the entire length of recirculating sections of hot water piping for a circulating system.) If R-4 is indicated on the Computer Summary (C-2R), the Point System Summary (P-2R), or the Certificate of Compliance (CF-1R) it is being calculated as a credit.

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## Questions and Answers (continued)

The installation requirements for receiving the R-4 piping insulation *credit* are:

- A non-recirculating water heating system
- R-4 (or greater) insulation
- Insulation applied to all 3/4" or larger hot water mains
- Neither attic, wall nor underfloor insulation can be used as a substitute for this pipe insulation.

These requirements are in addition to mandatory insulation requirements of Section 150(j).

### **Q** *Can I get pipe insulation credit for a recirculating water heating system?*

No. Recirculating water heating systems have a mandatory insulation requirement for the recirculating sections of hot water pipes. Pipes less than 2" must be insulated to R-4 and pipes greater than 2" need R-6 insulation.

### **Q** *What are the slab edge insulation requirements for a hydronic heating system with the hot water pipes in the slab?*

The requirements for slab edge insulation can be found in *Energy Efficiency Standards*, Sections 150(l) and 151(f)1., and the *Residential Manual*, pages 5-13 and 8-16.

Material and installation specifications:

- R-10 installed to a depth of 16 inches or to the depth of the footing, whichever is less
- Protected from physical damage and ultra-violet light deterioration
- Water absorption rate no greater than 0.3 percent (ASTM-C-271)
- Water vapor permeance no greater than 2.0 per/inch (ASTM-E-96-90)

Modeling assumptions:

- Do not model or calculate R-10 insulation; it is a mandatory requirement for this type of heating system. Instead assume R-0 in climate zones 1-15 or R-7 in climate zone 16.

### **Q** *What are the slab edge insulation requirements for typical slab-on-grade construction?*

Most compliance approaches do not require any slab edge insulation. In prescriptive compliance some packages may require R-7 slab edge insulation (*Energy Efficiency Standards*, Section 151(f)). If slab edge insulation is specified in a performance compliance approach (points or computer), or if it is required by the prescriptive package selected, it must meet the material and installation specifications indicated in the previous answer.

**NOTE:** For the length of slab edge located between a conditioned space and an enclosed unconditioned space (e.g., garage), see pages 4-16 and 5-13 of the *Residential Manual* for allowed compliance assumptions.

### **Q** *If the plans show an electric resistance heater in the bathroom, do I have to include this heater in the energy compliance calculations?*

If the bathroom has a supply duct from the main space conditioning system (typically gas-fired), you can ignore the electric space heating. If the room, however, does not have a supply vent from the main system, the supplemental electric resistance is the heat source for the space. In this latter case you must use a performance compliance approach and model two systems—the main system for the house and the electric system for the bathroom.

**NOTE:** Consult the *Residential Manual* or your program User's Manual for guidance in modeling multiple zones that are not zonally controlled.

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## Questions and Answers (continued)

**Q** *If I plan to add a water heater as part of my addition, how are the energy calculations affected (for example, do I have to use an “existing plus addition” approach)?*

If you are showing compliance using an “addition alone” compliance approach, a water heater with the following characteristics may be installed (see NOTE for documentation requirements):

<u>Fuel/Type</u>	<u>Efficiency</u>	<u>External Wrap</u>	<u>Distribution</u>
Gas/Storage	≥0.53 EF	R-12	STD
Gas/Storage	≥0.59 EF	R-0	STD
Gas/Storage	≥0.55 EF	R-6	STD
Gas/Storage	≥0.54 EF	R-0	POU
Gas/Storage	≥0.57 EF	R-0	PI

Where there is *no natural gas* service to the building, a water heater with the following characteristics may be installed in an addition without credit/penalty in compliance calculations (see NOTE):

<u>Fuel/Type</u>	<u>Efficiency</u>	<u>External Wrap</u>	<u>Distribution</u>
Electric/Storage	≥0.90 EF	R-12	STD
Electric/Storage	≥0.995 EF	R-0	STD
Electric/Storage	≥0.95 EF	R-0	PI
Electric/Storage	≥0.93 EF	R-6	STD
Electric/Storage	≥0.92 EF	R-6	PI
Electric/Storage	≥0.92 EF	R-0	POU
Electric/Instant	≥98% RE	—	STD
Electric/Instant	≥95% RE	—	POU
Electric/Instant	≥95% RE	—	PI

Storage = 50 gallon or less

EF = Energy Factor

RE = Recovery Efficiency

STD = Standard. No pumps, R-4 insulation on the first 5 feet of hot and cold water pipes.

POU = Point of Use. A maximum of 8 feet horizontal distance from water heater to all draw points [except laundry].

PI = Pipe Insulation. R-4 insulation on entire length of hot water piping (R-6 for pipes > 2") in addition to the first 5' of cold water piping.

**NOTE:** Document any of these systems in the compliance calculations as energy neutral — no energy credit, no energy penalty. The point system (P-2R) must reflect 0 points; computer compliance (C-2R) must reflect equivalent water heating energy use for the “standard” and “proposed” building (compliance margin 0). Actual system features should be noted or written on the CF-1R, under Water Heating Systems or Special Features.

In order to take credit for water heating system features, or for a water heating system with features other than those outlined here, you must use an existing-plus-addition compliance approach. (*Energy Efficiency Standards*, Section 152 (a), EXCEPTION NO. 3.)

## NONRESIDENTIAL STANDARDS

### Questions and Answers

**Q** *Near the designer’s signature on all of the Certificate of Compliance forms (ENV-1, MECH-1, LTG-1) is a place for the license number and date. Is this the date the license expires, or when the document is signed?*

It is the date the document is signed.

**Q** *If a space will not be conditioned for human comfort, is it exempt from the Energy Efficiency Standards?*

Not necessarily. Although the definitions of mechanical heating and mechanical cooling (Section 101(b)) both use the phrase “human comfort,” ASHRAE defines comfort conditioning as conditioning in the range of 55-90°F. Since the scope of the Standards (Section 100) includes a space that is “directly conditioned” within the range of 55 and 90°F, a space conditioned in this range must comply. To illustrate:

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## Questions and Answers (continued)

*In SITUATION #1:* Space conditioning is provided for computers which must be maintained at 75°F or less (not for human comfort). The space will be unoccupied, except for maintenance and repair.

*RESOLUTION:* The space must comply since it is maintained within the range of human comfort.

*In SITUATION #2:* A water treatment plant will have heating to prevent pipes from freezing. The thermostat cannot be set higher than 50°F. There will be no human occupancy.

*RESOLUTION:* If the building official makes the following two determinations, the building does not need to comply with the standards:

- (1) There must be evidence that the space is not being conditioned to within comfort conditions. This can be determined if a building has only heating and is controlled by a thermostat that cannot be set above 55°F. For example, a thermostat shipped from the manufacturer with a fixed setpoint that is not adjustable by others.
- (2) Reasonable evidence indicates that the building is not for occupancy by humans. This requires judgment on the part of the building official. Some pertinent questions in making this determination are: Is there no space for people to erect an office inside the building? Is the building a very noisy space? Is the building full of operating equipment that does not require nearly continuous human intervention to operate?

**Q** *When the building department asks for “Title 24 compliance” on a lighting alteration, what compliance is required?*

Compliance with *applicable* mandatory requirements is necessary for **every** lighting alteration regardless of how big or small the alteration (Section 149(b)1). Some alterations

will require compliance with lighting power density requirements (Section 149(b)1.D).

When a project involves relocating light fixtures:

- Local switching must be maintained so that, after the alteration, any lights within a room are controlled by a switch within that room (Section 131(a)).

When the project involves rewiring:

- Bi-level switching is required if the altered area exceeds 100 square feet with a light level of 1.2 Watts/ft<sup>2</sup> or greater (Section 131(b)).
- Separate switching for the daylit area is required if the altered area is within a daylit space that exceeds 250 square feet (Section 131(c)).

- Tandem wiring of one- and three-lamp luminaires is required (Section 132).

Additional requirements:

- Shut-off controls are required when the area served by the altered lighting is 5,000 square feet or more (Section 131(d)).
- New lamps and ballasts that are of a type regulated by the *Appliance Efficiency Regulations* must be certified (Section 111).
- New lighting controls must meet applicable criteria contained in Section 119.

When fixtures (consisting of lamp, ballast and housing) are replaced:

- If more than 50 percent of fixtures within the permitted space are replaced, you must comply with lighting power density requirements of Section 146.

When adding lights:

- If the connected load is increased, the lighting alteration must comply with lighting power density requirements of Section 146.

*(continued on page 6)*

## Questions and Answers (continued)

**NOTE :** There are exceptions and alternative methods of complying with each of these sections which are not covered in this discussion. Consult the *Energy Efficiency Standards* and the *Nonresidential Manual*, pages 5-7 through 5-14 for more detailed information.

**Q** *If an alteration involves moving or installing new cubicle walls, does this trigger any requirements of the Energy Efficiency Standards?*

Yes. If the partitions are ceiling-height, this alteration requires that accessible local switching for the lights within the room or space be provided and that the switch controls only the lights in that room or space (Section 131(a)).

**Q** *What are the duct insulation requirements for nonresidential mechanical systems?*

Section 124 of the *Energy Efficiency Standards* refers to Sections 601, 603, and 604 of the *Uniform Mechanical Code* for installation and insulation requirements. The insulation requirements from Section 604 of UMC are restated below:

Duct Location	Insulation R-value Mechanical Cooling	Heating Degree Days	Insulation R-value Heating Only
On roof on exterior	6.3	< 4500 4501-8000 > 8000	2.1 4.2 6.3
Attics, garages, crawl spaces	2.1	< 4500 4501-8000 > 8000	2.1 4.2
In walls, within floor to ceiling spaces except as noted*	2.1	< 4500 4501-8000 > 8000	2.1 2.1 4.2

\*No duct insulation is required on portions of ducts located in walls, and/or within floor to ceiling spaces, when:

- Both sides of space are exposed to conditioned air
- The space is not ventilated
- The space is not used as a return plenum
- The space is not exposed to unconditioned air

When the ceiling forms a plenum, it need not be insulated.

No duct insulation is required for:

- Ducts within conditioned space
- Ducts in basements
- Return ducts in plenums
- Ducts in a cement slab or in the ground

Two additional requirements should be noted:

1. Ducts located on the roof on exterior of the building must include an approved weatherproof barrier.
2. All joints in cooling system ducts must be sealed. A vapor retarder (not exceeding 0.5 perm) is required on cooling system supply ducts in spaces vented to the outside in geographic areas where the summer dew point temperature based on the 2-½ percent column of dry bulb and mean coincident wet-bulb temperature exceeds 60°F.

**Q** *Does a thermostat, required by Section 122(b), need to have numeric setpoints in degrees F? If so, why doesn't it state that explicitly like Section 122(c)2 does?*

Yes. The thermostat must have numeric setpoints in order to provide the capability of setting heating down to at least 55°F and cooling to 85°F or higher. The language in Section 122(c)2 was added because this was an issue for many hotel/motel guest rooms with controls that indicate warmer and cooler rather than temperature settings, which can result in wasted energy.

## DID YOU KNOW . . . ?

### Technical Assistance

. . . The announcement in the last issue of *Blueprint* indicated the FactsLine (FAXback system) would soon have additional documents available via FAX ((916) 653-6830). Currently available are:

- Residential Compliance Forms
- *Energy Efficiency Standards*, Parts 1 and 6 (by Section or page number)
- Blueprint Issues 41-55
- Roster of Certified Energy Plans Examiners (by geographic location)
- Energy Specs (aka Fact Sheets)
- Publications List
- Mailing List Application
- List of Approved Computer Programs
- Notices

Coming Soon:

- Nonresidential Compliance Forms

You can FAX documents to colleagues or yourself. The system is very user friendly. When you call, follow the verbal instructions which include entering the FAX number to which you want the document(s) sent and either requesting a list of available documents or entering the code of the specific document you are requesting. (For example, issues 41-55 of *Blueprints* are 20050\_\_ (the last two digits indicate the issue number).

The FactsLine # is always printed on the back page of each issue of *Blueprint*. This service is available 24-hours a day, seven days a week.

. . . If you've been unsuccessful in using the FactsLine, our statistics show that 9.8% of the FAXes failed for the following reasons:

- The number provided was a voice line rather than a FAX line
- The FAX number was busy for 15 minutes
- Wrong number

- Remote machine failure
- A problem with 800 numbers (which will be investigated)

. . . The Energy Commission's web page has listings of certified appliances that exceed the federal and state standard. Currently available listings include central air conditioners/heat pumps, central furnaces and refrigerator-freezers. (The entire appliance data base will, eventually, be accessible.) Once you select the system features (for example, single-package or split system air conditioner) you will view a list beginning with the most efficient models. Our web site address is always printed on the back page.

### Certification and Training

. . . The Certified Energy Plans Examiner Exams (CEPE) are scheduled for:

September 16	Residential Plans Examiner
October 24	Nonresidential Plans Examiner

Exams will be held on the dates noted in:

Sacramento  
Alhambra

The next exams will be held in the spring of 1997 (tentatively scheduled for May 20 and June 17, 1997). The cost is \$50 for building department employees and \$150 for all other participants. Contact CTI at (916) 456-3824 for registration information.

. . . If you'd like to take a class to help you prepare for the CEPE exam, California Association of Building Energy Consultants (CABEC) is offering full day workshops. The CEPE exam, which is the cornerstone for becoming a CABEC Certified Energy Analyst, is an important way for professionals and building department personnel to demonstrate proficiency with the 1995 residential and nonresidential *Energy Efficiency Standards*.

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## DID YOU KNOW . . . ? (continued)

The CABEC workshops will be held:

<u>Date</u>	<u>Location</u>	<u>Topic</u>
August 30	San Jose	Residential
September 5	Irwindale	Residential
September 23	Irwindale	Nonresidential
September 27	San Jose	Nonresidential

Advance registration is required. The cost is \$125 for CABEC members, \$225 for non-members (includes CABEC membership for 1996). For more information, please call the CABEC office at (916) 974-1045/FAX (916) 971-0156.

. . . If you would like to become an NFRC certified simulator, or find out more about fenestration product simulation, the National Fenestration Rating Council is holding a workshop in Reno, Nevada November 13-15, 1996. You will learn to model using NFRC approved software. You can attend a one-day introductory simulation workshop for \$400 or all three days for \$800. Class size is limited to 30 and registration deadline is October 10. Contact NFRC about the Simulation Accreditation Workshop at ☎ (301) 589-6372, FAX (301) 588-0854.

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